UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/927,680	08/10/2001	Ross Alexander Saunders	GOW 0075 PA	6091

7590 03/29/2005

Killworth, Gottman, Hagan & Schaeff, L.L.P.
Suite 500
One Dayton Center
Dayton, OH 45402-2023

EXAMINER	
LEUNG, CHRISTINA Y	

ART UNIT	PAPER NUMBER
2633	

DATE MAILED: 03/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/927,680	SAUNDERS ET AL.
	Examiner	**Art Unit**
	Christina Y. Leung	2633

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 August 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *26-35* is/are allowed.

6)☒ Claim(s) *1-7 and 9-25* is/are rejected.

7)☒ Claim(s) *8* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 August 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *1-25-02; 3-17-03*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 9 recites "said optimal prechirp" in line 1 of the claim. There is insufficient antecedent basis for this limitation in the claim because claim 1 on which it depends does not recite an "optimal prechirp." Examiner respectfully notes that claim 9 may depend on claim 4 instead.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 20, 21, and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Ishikawa et al. (US 5,717,510 A).

Regarding claim 20, Ishikawa et al. disclose an optical transmitter for a WDM network (Figures 16, 22, and 47-49) comprising:

means for generating an optical signal by intensity modulating a data signal and launching same over an optical transmission medium (i.e., intensity modulator 107 in Figure 22, part of an optical transmitter such as shown in Figure 47; column 18-67; column 19, lines 1-5);

a phase modulator 108 for phase-modulating the optical signal with a prechirp signal (column 18, lines 65-67; column 19, lines 1-15);

a controller (such as transmission characteristic measurement element 105 in Figures 16 and 47-49) for receiving a signal degradation factor indicative of the degradation of the optical signal along the transmission medium and adjusting the prechirp signal accordingly (column 16, lines 53-65; column 18, lines 13-67; column 19, lines 1-21; column 21, lines 52-59).

Regarding claim 21, Ishikawa et al. disclose that the phase modulator108 is a single-ended waveguide section for routing the optical signal while applying the prechirp signal on an electrode placed along the waveguide (Figure 22; column 18, lines 18-67; column 19, lines 1-5).

Regarding claim 24, Ishikawa et al. disclose that means for generating is a Mach-Zehnder modulator for routing a continuous wave (CW) along two waveguides and applying the data signal on an electrode along one of the waveguides (see Mach-Zehnder modulator 107 in Figure 22).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-7 and 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishikawa et al. in view of Swanson et al. (US 6,433,904 B1).

Regarding claim 1, Ishikawa et al. disclose a method for optimizing quality of a data signal transmitted over an optical WDM network (Figures 16, 22, and 47-49), comprising:

generating, at a transmit site an optical signal, by intensity modulating the data signal over an optical carrier (using intensity modulator 107 shown in Figure 22);

phase modulating the optical signal with a prechirp signal (using phase modulator 108 in Figure 22; column 18, lines 64-67; column 19, lines 1-5; column 21, lines 42-59);

transmitting the optical signal from the transmit site to a receive site (as shown in Figure 47, for example);

recovering the data signal from the optical signal at a receive site (using optical receiver 103);

determining a degradation factor indicative of the distortion suffered by the optical signal between the transmit and the receive sites (using transmission characteristic measurement element 105); and

controlling the amplitude of the prechirp signal with the degradation factor (column 16, lines 53-65; column 18, lines 13-67; column 19, lines 1-21; column 21, lines 52-59).

Although Figures 16, 22, and 47-49 do not specifically show wavelength division multiplexing, Ishikawa et al. further disclose that the system may be a WDM network (see column 19, lines 10-12, and Figure 65 and column 26, lines 45-59, for example).

Regarding claim 15, as similarly discussed above with regard to claim 1, Ishikawa et al. disclose a method for optimizing quality of a plurality of data signals transmitted over an optical WDM network, comprising, for each data signal (Figures 16, 22, and 47-49):

generating, at a transmit site, a respective optical signal, by intensity modulating a respective data signal over an associated optical carrier (using intensity modulator 107 shown in Figure 22);

phase modulating the respective optical signal with a respective prechirp signal (using phase modulator 108 in Figure 22; column 18, lines 64-67; column 19, lines 1-5; column 21, lines 42-59);

transmitting the respective optical signal from the transmit site to a receive site (as shown in Figure 47, for example);

recovering the respective data signal from the respective optical signal at the receive site (using optical receiver 103);

determining a respective degradation factor indicative of the distortion suffered by the respective data signal between the transmit and the receive sites (using transmission characteristic measurement element 105); and

controlling the amplitude of the respective prechirp signal with the degradation factor (column 16, lines 53-65; column 18, lines 13-67; column 19, lines 1-21; column 21, lines 52-59).

Again, although Figures 16, 22, and 47-49 do not specifically show wavelength division multiplexing, Ishikawa et al. further disclose that the system may be a WDM network (see column 19, lines 10-12, and Figure 65 and column 26, lines 45-59, for example).

Regarding both claims 1 and 15, Ishikawa et al. do not specifically disclose generating an FEC encoded optical signal. However, Swanson et al. teach an WDM optical communications system related to the one disclosed by Ishikawa et al. including determining a degradation factor of signals at the receiving end and providing feedback based on the degradation factor (Figures 3 and 6). Swanson et al. further teaches generating an FEC encoded optical signal (column 5, lines 3-9 and lines 65-67; column 6, lines 1-5; and column 9, lines 20-52).

Regarding claims 3 and 17 in particular, Swanson et al. discloses that the step of determining a degradation factor comprises FEC decoding each the respective optical signal and counting a respective number of errors corrected in each the data signal (column 9, lines 20-52).

Regarding claims 1, 3, 15, and 17, it would have been obvious to a person of ordinary skill in the art to generate FEC encoded optical signals as taught by Swanson et al. in the method disclosed by Ishikawa et al. in order to provide a signal that can better overcome the effects of dispersion during transmission (Swanson et al., column 5, lines 65-67; column 6, lines 1-5) and that can be used to provide a measurement of degradation (such as a bit error rate) at the receiving end of the system (Swanson et al., column 9, lines 20-52). Ishikawa et al. already disclose that the transmission characteristic measuring section measures bit error rates to determine information for the feedback control signals (column 12, lines 41-57).

Regarding claim 2, Ishikawa et al. discloses that the phase modulating step includes modulating the optical signal with an independent phase modulation signal over the intensity modulation signal (Figure 22; column 18, lines 64-67; column 19, lines 1-5).

Regarding claim 16, Ishikawa et al. disclose that the step of transmitting includes multiplexing all the respective optical signals into a WDM signal at the transmit site, launching

the WDM signal towards the receive site and demultiplexing the WDM signal at the receive site to obtain the respective optical signals (Figures 8 and 65; column 26, lines 45-61).

Regarding claims 4 and 18, Ishikawa et al. further disclose that the controlling the amplitude of the prechirp signal comprises

transmitting each the respective degradation factor from the receive site to the transmit site (over the "control signal feedback" path as shown in Figure 47);

processing each the respective degradation factor into a respective control signal of an optimal prechirp (column 16, lines 53-58; column 19, lines 17-21); and

synchronizing the respective control signal with the respective optical signal (Ishikawa et al. disclose that the controlling the prechirp includes applying phase modulation in coordination/synchrony with the pulses of the optical signal; column 18, lines 13-67; column 19, lines 1-5).

Regarding claims 5 and 19, Ishiakawa et al. disclose that the degradation factor is transmitted over a respective telemetry feedback link (i.e., the "control signal feedback" path as shown in Figure 47).

Regarding claims 6 and 7, Ishikawa et al. disclose transmitting the degradation factor over a feedback channel that may be considered an "optical service channel" (since it is a signal containing information for servicing/optimizing the system) or a "data communication channel" (since it is a signal containing data). Examiner respectfully notes that the claims do not recite any further specific details regarding "an optical service channel" or "a data communication channel."

7. Claims 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishikawa et al. in view of Swanson et al. as applied to claims 1, 3, and 4 above, and further in view of Alferness et al. (US 5,627,915 A).

Regarding claims 12-14, Ishikawa et al. in view of Swanson et al. suggest an optical communications method as discussed above with regard to claims 1, 3, and 4, including a transmit site and a receive site. They do not specifically disclose optical switches. However, optical networks are well known in the art. Alferness et al. in particular teach such a network (Figure 2), including optical communications between first and second optical switches 10 as data is transmitted across large distances. Regarding claims 12-14, it would have been obvious to a person of ordinary skill in the art to have the receive site and/or the transmit site in the method already described by Ishikawa et al. in view of Swanson et al. comprise optical switch nodes such as taught by Alferness et al. in order to provide optimized prechirped signals between the nodes of a large optical network., especially since signals are more likely to deteriorate when transmitted across large distances.

8. Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishikawa et al.

Regarding claim 22, Ishikawa et al. disclose a system as discussed above with regard to claims 20 and 21 including a phase modulator. They do not specifically disclose a variable gain electrical amplifier, but Examiner notes that they do disclose that "the prechirping amount α can be varied continuously by varying the voltage being applied to the phase modulator 108" (column 19, lines 1-2). Variable gain electrical amplifiers are well known circuit elements in the art, and it would be well understood in the art that this function of varying the amplitude of the

electrical signal input to the phase modulator (as disclosed by Ishikawa et al.) may be easily provided by a variable gain electrical amplifier. It would have been obvious to a person of ordinary skill in the art to specifically include a variable gain electrical amplifier in the system disclosed by Ishikawa et al. as a readily available and simple way to implement the varying of the electrical signal amplitude already specifically disclosed.

Regarding claim 23, Ishikawa et al. disclose that the variably amplified electrical signal is synchronized with the data clock. Specifically, Ishikawa et al. disclose that the controlling the prechirp includes applying phase modulation in coordination/synchrony with the pulses of the optical signal (column 18, lines 13-67; column 19, lines 1-5).

9. Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishikawa et al. '510 in view of Swanson et al. as applied to claims 1, 3, and 4 above, and further in view of Ishikawa et al. '637 (US 5,917,637 A; hereafter referred to as "Ishikawa et al. '637" in order to distinguish the reference from Ishikawa et al. '510).

Regarding claims 9-11, as well as the claims may be understood with respect to 35 U.S.C. 112 discussed above, Ishikawa et al. '510 in view of Swanson et al. describe a system as discussed above with regard to claims 1, 3, and 4 including determining an optical prechirp. Ishikawa et al. '510 in view of Swanson et al. do not further specifically suggest storing the optimal prechirp in memory.

However, Ishikawa et al. '637 teach an optical communications system (Figure 1) related to the one described by Ishikawa et al. '510 in view of Swanson et al. including control means 10 that controls a prechirp signal from bias circuit 6 (column 3, lines 50-52; column 6, lines 1-43). Ishikawa et al. '637 further teach storing a calculated desired prechirp signal (which is in the

form of a "bias current" signal in the system taught by Ishikawa et al. '637 and referred to as such in their specification) in memory (Figure 10; column 6, lines 54-65).

It would have been obvious to a person of ordinary skill in the art to include storing the optimal prechirp as taught by Ishikawa et al. '637 in the method described by Ishikawa et al. '510 in view of Swanson et al. in order to preserve the calculated desired prechirp control signals and thereby continue to maintain the desired level of prechirp, especially if the optimal signals are only determined periodically (periodic adjustment is disclosed by Ishikawa et al. '510 in column 19, lines 22-27).

Regarding claim 10, Ishikawa et al. '510 disclose that the optimal prechirp is used for the life of the optical signal (column 14, lines 45-52; column 17, lines 7-14; column 19, lines 22-27).

Regarding claim 11, Ishikawa et al. '510 disclose that the optimal prechirp is reassessed as desired during the life of the optical signal (column 19, lines 22-27).

10. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishikawa et al. '510 in view of Ishikawa et al. '637.

Regarding claim 25, Ishikawa et al. '510 disclose an optical transmitter as discussed above with regard to claim 20 including means for controlling and adjusting the prechirp signal (i.e., transmission characteristic measurement element 105. They further disclose that this element generally includes a microprocessor/CPU with means for converting the degradation factor into the prechirp signal (since they disclose determining a degradation factor and using it to control the prechirp; see also column 17, lines 7-22).

Ishikawa et al. '510 do not specifically disclose a memory for storing an optimal level of the prechirp signal.

However, again, Ishikawa et al. '637 teach an optical communications system (Figure 1) related to the one described by Ishikawa et al. '510 in view of Swanson et al. including control means 10 that controls a prechirp signal from bias circuit 6 (column 3, lines 50-52; column 6, lines 1-43). Ishikawa et al. '637 further teach that control means 10 comprises a microprocessor including means for calculating a prechirp signal, and means for storing a calculated desired prechirp signal (which is in the form of a "bias current" signal in the system taught by Ishikawa et al. '637 and referred to as such in their specification) in memory (Figure 10; column 6, lines 54-65).

It would have been obvious to a person of ordinary skill in the art to include a memory as taught by Ishikawa et al. '637 in the system disclosed by Ishikawa et al. '510 in order to calculate and preserve the calculated desired prechirp control signals and thereby continue to maintain the desired level of prechirp, especially if the optimal signals are only determined periodically (periodic adjustment is disclosed by Ishikawa et al. '510 in column 19, lines 22-27).

Allowable Subject Matter

11. Claims 26-35 are allowed.

12. Claim 8 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 8, Ishikawa et al. '510 in view of Swanson et al. disclose a method as discussed above with regard to claims 1, 3, and 4, but the prior art including Ishikawa et al. '510 and Swanson et al. does not specifically disclose or fairly suggest a method including the specific

combination of all the elements, steps, and limitations recited in claim 8 (and including all the limitations of the parent claims on which it depends), particularly wherein the optimal prechirp is determined according to a Q versus prechirp graph provided by measuring the quality factor Q of the optical signal at the receive site for a plurality of given prechirp levels, and selecting the optimal prechirp associated with a maximum Q on the graph.

Regarding claim 26, Ishikawa et al. '510 generally discloses an optical transport system for optimizing the quality of an optical signal transmitted over an optical channel as discussed above including means for modulating an optical signal with a modulation prechirp signal (i.e., intensity modulator 107 and phase modulator 108 in Figure 22) and means for calculating a signal degradation factor and a corresponding value of the signal quality (i.e., transmission characteristic measurement element 105 in Figure 47). They further disclose means for modifying the prechirp signal as discussed above. However, the prior art, including Ishikawa et al. '510, Swanson et al., and Ishikawa et al. '637, does not specifically disclose or fairly suggest a system including the specific combination of all the elements, functions, and limitations recited in claim 26, particularly including means for modifying a prechirp signal over a predetermined range of system operation so as to obtain a plurality of prechirp levels and corresponding values of the signal quality; means for storing the plurality of prechirp levels and corresponding values of the signal quality; and means for comparing and determining a maximum channel value of the signal quality, whereby an optimal channel prechirp corresponding to the maximum channel value of the signal quality is derived.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christina Y. Leung whose telephone number is 571-272-3023. The examiner can normally be reached on Monday to Friday, 6:30 to 3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571-272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Christina Y Leung
Christina Y Leung
Patent Examiner
Art Unit 2633